Complications in atrial septal defect device closure

Arani R. Raghuram*, Ramiah Krishnan, Subbiah Kumar, Kathamuthu Balamurugan

Department of Cardiothoracic Surgery, Meenakshi Mission Hospital and Research Center, Melur Road, Madurai 625 107, India

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Abstract

Atrial septal defect (ASD) is a common congenital cardiac anomaly. Even though surgery is the gold standard, percutaneous device closure is gaining popularity because of the short learning curve, cosmetic advantage and relative safety. The long-term implications are open to question. We report here two cases where surgical intervention was required during attempted percutaneous closure and briefly review the relevant literature.

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1. Introduction

Atrial septal defect (ASD) is the commonest surgery performed by cardiac surgeon in training to learn the basics of cardiopulmonary bypass. Of late this entity is slowly slipping out of the surgeon's hands because of the percutaneous devices. Their usage has gone up significantly because of the short learning curve, cosmetic benefits and safety. However, there is a definite role for the cardiac surgeon in this as exemplified in two of our patients described below.

2. Case report

2.1. Case 1

A 30-year-old lady underwent an uneventful device closure with 30 mm Blockaid ASD Occluder (Shangai Shape Memory Alloy Company, China) under transesophageal echocardiographic (TEE) guidance. She was fine at first month follow-up. Two months after the procedure she complained of vague chest pain and breathlessness. TEE done at that time (Fig. 1) revealed the device in a partially displaced state with significant left to right shunt. At surgery (Fig. 2), the device was found attached to a narrow area of the posterior margin with the rest of the device hanging loosely. The ASD had well defined margins and appeared to be a good case for device closure. It was removed by carefully incising the attached margin of ASD and a pericardial patch was sutured. She made an uneventful recovery.

2.2. Case 2

A 40-year-old gentleman with 36 mm ASD with left to right shunt with moderate pulmonary hypertension and moderate right ventricular dysfunction was advised surgical closure. He elected to have device closure. A 40 mm Blockaid device was used to close the ASD. About 10 min after deployment, the device displaced from the site and left to right shunt increased. As it was being observed it gradually got detached and embolised into the right ventricle. A second attempt was made to reposition the device but failed. During the process he developed hemodynamic disturbance. So the procedure was abandoned and taken up for surgical closure. The device was removed percutaneously by holding with a bioptome introduced transfemorally and pulling out. Surgery was scheduled for the next day. At surgery the defect was large with laceration of the posterior rim. He underwent pericardial patch closure and was discharged on the seventh postoperative day.

3. Discussion

King and Mills [1] reported in 1976 the feasibility of percutaneous closure of ASD. Latson et al. [2] in 1991 reported successful closure of ASDs in 500 patients with Bard clamshell device. It is gaining popularity because of the short learning curve, cosmetic benefits, reduced pain and reduced hospital stay. However, technical complications with occasional deaths have been reported. The complications reported include cardiac perforations, device malposition or embolisation, residual shunts, vascular trauma, thrombus formation, atrioventricular valve regurgitation, atrial arrhythmias, infectious endocarditis and sudden death [3].

Malposition or embolisation is the commonest reason for surgical intervention. Out of 124 patients who underwent percutaneous closure of ASD, ten patients needed surgical intervention [3]. Seven of these ten patients needed the intervention because of malposition or dislocation. Chessa et al. [4] reported on 417 patients of whom ten patients...
Device-related perforations occurred frequently after hospital discharge. The anterosuperior atrial wall and/or adjacent aorta are uniquely vulnerable. Perforations have occurred even after six months.

Residual shunts are more frequent with percutaneous closures than with surgical closures. Rao et al. [7] found color Doppler evidence of residual shunts in 45% of patients. Worms et al. [8] found residual shunt in 37% patients with Sideris device. There are many reports of surgical closure of atrial septal defects with no residual shunt.

The incidence of thrombus formation is 1.2% in ASD patients and 2.5% in patent foramen ovale (PFO) patients in a study of 1000 patients who underwent percutaneous device closure [9]. Post-procedure atrial fibrillation and persistent atrial septal aneurysm were significant predictors of thrombus formation. The Amplatzer device with nitinol wire covered with expanded polytetrafluoroethylene fabric is less thrombogenic than CardioSEAL and StarFLEX devices, which have a metallic framework with Dacron fabric.

4. Conclusion

Transcatheter closure of ASD is gaining popularity. The procedure related complications are small but not negligible. Absence of residual shunts and late thromboembolic events is in favor of surgical closure of ASD. Minimally invasive techniques address cosmetic angle without compromising results. The need for lifelong antiplatelet agents and SBE prophylaxis has to be weighed against the disadvantage of a small incision. A promising early result does not guarantee a favorable late outcome. Austin [10] in his editorial has rightly reminded us of our experience with Ionescu–Shiley and Bjork–Shiley valves to emphasize the need for continued follow-up and critical evaluation of this method against the gold standard of surgical closure of ASD.

References


